The Fauna of Akkeshi Bay
III. Oligochaeta

By

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(With Plate VI and one Textfigure)

The present paper is based on the following collections placed at the writer's disposal for study and identification:— 1) The oligochaete collection obtained from the biological survey of the Akkeshi Bay carried out by Prof. T. Uchida and Messrs. Y. Hada, M. Iwasa, S. Okuda and H. Ishizuka in 1933, 2) the specimens collected by Mr. K. Hanaoka at Besshakudomari in August, 1932, and 3) the specimens collected by Mr. S. Makino at Shiribazaki in July, 1933. All the collections present but a single littoral species referable to the genus *Pachydrilus* belonging to the Enchytraeidae, of which many species have been recorded from coasts of the arctic, the subarctic and the subantarctic regions, but as yet none from the coasts of Japan. The littoral species seems to the writer to be a new representative of the genus. Cordial thanks must be extended to Prof. T. Uchida for his kind guidance and criticism, and also to the above mentioned gentlemen for specimens. Many thanks are also due to Dr. L. Černosvitov of Prague, who kindly sent a copy of important literature to the writer.

Pachydrilus nipponicus sp. nov.

Length, 25–30 mm; maximum diameter, 0.8 mm. Number of segments, 57–71, usually counting not far from 60. Prostomium roughly triangular with a rounded anterior end. Clitellum encircling segments XII–XIII and slightly extended over, both anteriorly and

posteriorly, to the neighbouring segments (XI and XIV). Body yellowish to brownish white in colour in living state and white in specimens preserved in formalin. Blood, slightly red-coloured. Head pore on O/I. No dorsal pore. Epidermis with gland cells which are deeply stained and arranged in transverse rows. Four setae bundles per segment; each bundle consists of different number of setae, which are all single-pointed and deficient in nodulus (Fig. 1. A, B). Setae in a bundle are generally sigmoid and subequal in length, but in preclitellar region, some are "enchytraene" (straight forms with or without a curved proximal end). The ventral setae commonly count 6(5–8) in number in front of the clitellum, and 5(4–6) behind it; the lateral 5(3–5) in front of, and 3(2–4) behind the clitellum. The ventral bundles of segment XII have disappeared in mature specimens. Male pores, one-paired on segment XII. Female pores, also one pair in intersegment XII/XIII. These reproductive pores are situated on the ventral setal line. Spermathecal pores, one pair on the lateral sides of intersegment IV/V.

Septa begin with intersegment IV/V; septal glands on three septa, IV/V, V/VI and VI/VII; those located on septa V/VI and VI/VII are fairly bulky (Pl. VI, 2); the hindmost belonging to septum VI/VII projects backwards into the cavity of segment VII, barely reaching septum VII/VIII. Coelomic corpuscles, oval or elongated pear-shaped disks, 30–40 μ in longer diameter, nucleated. They are found floating freely in the coelomic fluid or attached to septa through their narrow ends. Their cell bodies are granular in constitution and stainable blue with Delafield's Haematoxylin. Oesophagus merges gradually into intestine. No salivary gland which is found in *Fridericia* and many species of *Enchytraeus*, while one pair of pharyngeal bulbs are present as usual in *Pachydrilus*. No chyle cell present. Cerebral ganglion, roughly rectangular, its length longer than its width. The hinder end of the cerebral ganglion, slightly concave, forming two short blunt lobes. Dorsal vessel originates on segment XIV or XV. Nephridia begin in segment VIII, but segments XI, XII and XIII are destitute of the organ. The anteseptal part of the nephridium, small and consists of a funnel only; the postseptal of an oval compact mass, flattened from side to side and narrowing anteriorly (Fig. 1, D). Its duct is given off from the hinder end of the postseptal, and passes downwards and forwards to its external opening located in front of the ventral setae bundle.

One pair of testes attached to the ventral end of septum X/XI; each consists of a number of elongated pear-shaped (or club-shaped) lobes, containing in their investing membrane male reproductive cells in various stages of development (Pl. VI, 5). The lobes radiate from their attachment at their narrow end, extending forwards into segment X and backwards into XI. One pair of male funnels, in segment X, long and cylindrical, slightly narrower backwards, about three

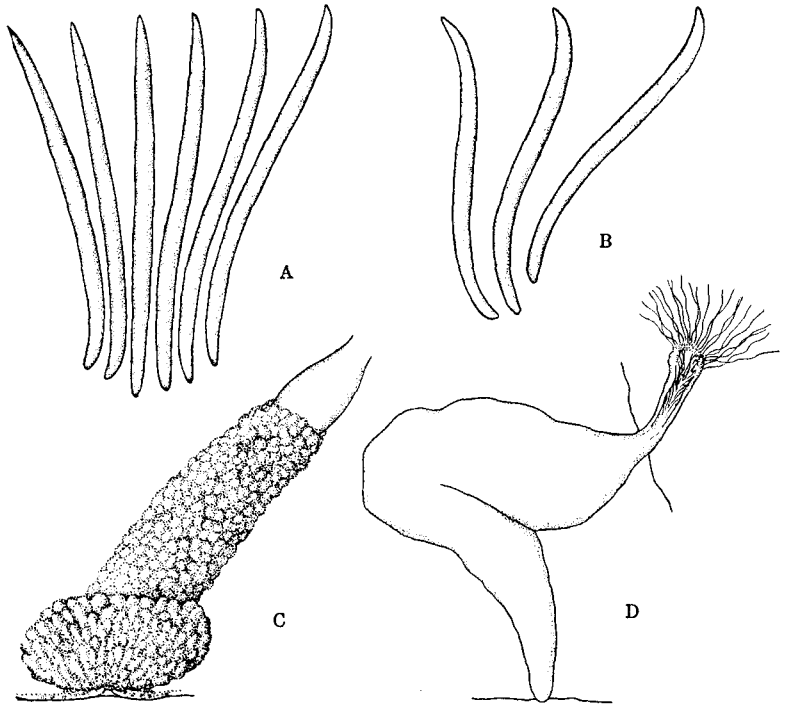

Fig. 1. *Pachydrilus nipponicus* n. sp. A, ventral setae bundle in a preclitellar segment, ca ×360; B, lateral bundle in a post-clitellar segment, ca ×360; C, spermatheca, ca ×150; D, nephridium, ca ×130.

times as long as broad. Their free margin very wide. Sperm duct, very long and folded several turns in segment XII. One pair of ovaries, in segment XII, attached to the ventral wall at intersegment XI/XII. They are much lobed. One pair of penial bulbs, in segment XII, attached to the ventral wall. They are so-called "lumbricilline" type (Pl. VI, 6). Each bulb is a large subspherical mass about

330–400 μ by 200–280 μ in mature specimens. It is provided with a strong muscular capsule which is a reflection of the musculature of the body wall. The interior of the bulb is filled with two kinds of cells. The first cells surrounding the penial lumen are long columnar and faintly stained, with nuclei at their basal portion. The second cells occupying the peripheral part of the bulb, are deeply stained, fusiform, with their long axes directed toward the penial lumen. The sperm duct enters the penial bulb from its post-lateral side faced toward the body wall, and opens into the penial lumen by a narrow canal situated in the central part of the bulb. Spermathecae, a single pair in segment V, are rather cylindrical (Fig. 1, C), communicating with the oesophagus. There are gland cells along the whole length of their duct, forming a glandular envelope. Those cells located at the ectal end of the duct are so elevated that they are distinguishable as a basal glandular collar. The wall of the duct has a well-developed muscle layer near its lumen (Pl. VI, 7). Ampulla small, pear-shaped and distinguished from the duct by the lack of such a glandular envelope. Copulatory glands located from segment XIV to XVIII, XIX or XX (mostly in segments XIV–XIX). The glands are more or less different in size in segments and individuals; well-developed ones usually extend above the ventral nerve cord, but do not enclose it (Pl. VI, 3). In segments III–IX, small copulatory glands are found. They are attached to the lower half of the ventral nerve cord and are observable only in sections. The gland cells of these copulatory glands contain much fine secretion stainable with eosin. Their ductules are long and slender assembling into a bundle under the ventral nerve cord. They pass downwards through the muscle layers of the body wall, and then are divided inside the epidermis so as separately to open outside in a definite area.

Localities and Habitat:—The present species is common along the shore of Akkeshi Bay, crowding under stones or half decayed sea-weeds on sandy beaches or on the gravelly flat between the high and low tide marks. In July and August, 1933 the species was found in abundance quite on the shore of Kojima. The principal features of this habitat are a smooth, small-gravelly, gently sloping beach where small pieces of organic matter in various stages of decomposition are scattered among small gravels. The specimens collected from Oshoro in 1932 by Dr. T. Uchida and Mr. M. Iwasa, and from

Motomari (Muroran) in 1934 and Shibetsu (near Nemuro) in 1935 by Mr. S. Okuda seem to be identical with the present species. It is, therefore, supposed that the present species is widely distributed on the coasts of Hokkaido.

Remarks:—So far as the writer is aware, although many enchytraeids are known in the western coasts of North America, no littoral enchytraeid has hitherto been reported from the Asiatic coasts of the North Pacific. The present species seems to resemble *Pachydrilus annulatus* (Eisen) reported from Alaska. But both species are mainly different in form and structure of nephridia and in body length. The "enchytraene" setae observed in the present species are present in *P. viridis* (Steph.) and *P. aegialites* (Steph.). But, in both of Stephenson's species, the copulatory glands are very much smaller or fewer than those of the present species.

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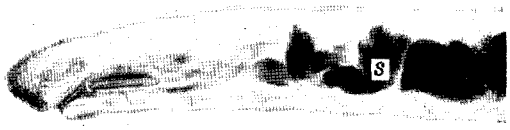
Explanation of Plate VI

Pachydrilus nipponicus n. sp.

1. Dorsal view of body (Total mount), ×5.
2. Lateral view of anterior part of body, showing septal glands (s) (Total mount), ×20.
3. Transverse section of the copulatory gland in segment XVI, ×160; l, lobe of the gland; n, nerve cord.
4. Transverse section of the copulatory gland in segment V, ×480; g, gland cells; n, nerve cord.
5. Transverse section through segment XI, showing testes, ×55.
6. Transverse section through segment XII, showing penial bulbs, ×160.
7. Transverse section of duct of spermatheca, showing well-developed muscle layer and glandular envelope, ×480; g, glandular envelope; m, muscle layer.
8. Transverse section of ampulla of spermatheca, ×480.



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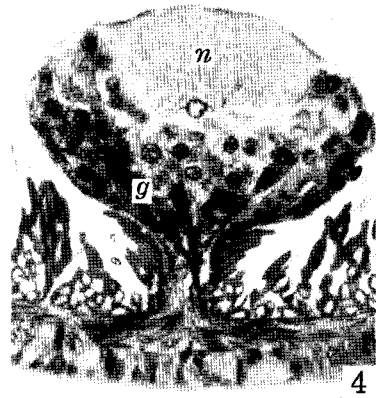

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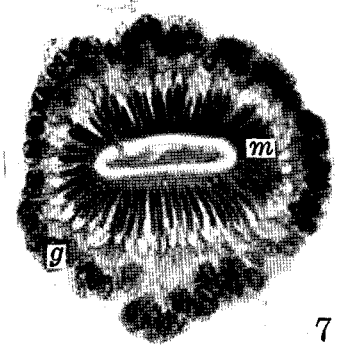

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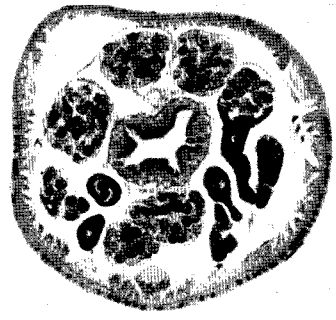

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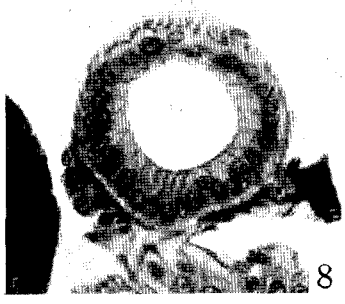

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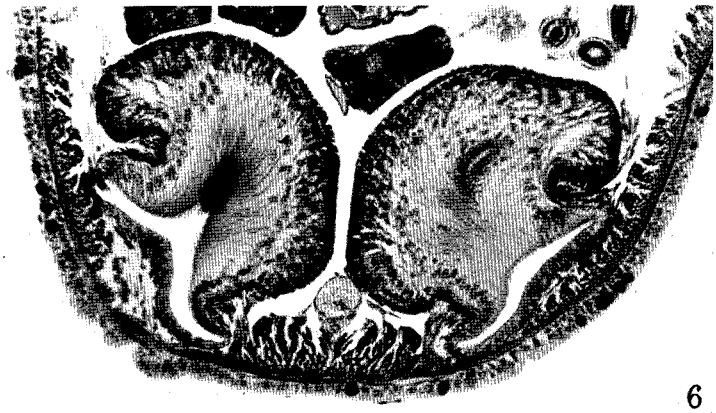

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H. Yamaguchi photo.

H. Yamaguchi: Oligochaeta of Akkeshi Bay